MARINE REVIEW.

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Lake Front Docks.

The announcement, a few days ago, that the new channel at Sailors' Encampment, St. Mary's river, was open, permitting of a draft of water of about 18 feet, as against not more than 14½ feet under old conditions, was in some respects a surprise to the vessel interests, notwithstanding the repeated assurances of some advantage being derived this fall from the 20-foot channel improvements. In a conversation relating to the development of lake commerce on a big scale that is certain to follow improvements of this kind, Mr. L. M. Bowers, who is the representative of John D. Rockefeller in shipping matters on the lakes, expressed the opinion that the city of Cleveland would be fully warranted in spending two or three millions of dollars in lake front improvements. He was surprised that cities like Buffalo and Cleveland should be depending upon a few thousand dollars each year from the government in river and harbor bills, these appropriations being uncertain at the best and the cities themselves doing nothing more than a little dredging each year within crowded harbors. Like a great many other men of large business affairs, Mr. Bowers, coming from the east and being made fully acquainted with the great progress that has attended all branches of lake business, was struck by the advantages that will be secured by the city on Lake Erie that will be first to construct lake front docks suitable to the increased traffic that will follow the 20-foot channel work. He was specially impressed with the situation in Cleveland on account of the advantages offered for further development of the iron industry.

It is well known, of course, that in both Buffalo and Cleveland there has been considerable agitation of the question of large expenditures, aside from the work of the general government, on harbor improvements. Commissions have been appointed by the mayors of both cities, but in both cases these commissions are simply of an advisory kind, and have no real power. President J. J. H. Brown of the Lake Carriers' Association is a member of the Buffalo commission. Mr. Brown seems to be working along the right lines in proving to the people of Buffalo that New York, as well as all of the principal European cities, had to expend great sums of money in order to build up their commerce in ships. Some figures which he presents on the subject are interesting.

In 1775 the Clyde was an insignificant waterway. In its shoalest places the river below Glasgow had only 3 feet 8 inches at high tide. At the present time its average depth at high water is from 27 to 29 feet. All this has been done by placing the entire charge of the river and docks under the control of a body know as the Clyde Trustees. In deepening the river and building docks, this body has expended upwards of $60,000,000 and the work of improvement is still going on on a large scale. The annual revenue of the Clyde Trustees is nearly $2,000,000 per annum, collected by port and dock charges, and used to pay current expenses, improvements and interest. In the year 1800 the population of Glasgow was 70,000. It is now over 800,000. But for the improvements of the Clyde it would have been an insignificant city.

Unlike Glasgow, Liverpool had a fair natural harbor, and at the beginning of the present century had 70,000 people, and a considerable shipping interest. There was, however, a great obstruction to navigation in the bar at the mouth of the Mersey. At Liverpool the docks consist of a great basin with gates at the entrance, which are open at flood tide, and when the tide begins to fall are closed until the next flood. The tolls are adjusted so as to involve no more than is required to pay for maintenance, interest and improvements.

Manchester is now connected with the ocean by a ship canal with a minimum depth of 26 feet. This canal was begun by a private corporation, but was completed by the city of Manchester. Notable harbor improvements have been made at the ports of Southampton, Swansea, Cardiff, Bristol, Boston, Hull, Stockton, Sunderland and New Castle. The city of Hamburg has but recently completed great improvements in dock facilities and their construction has been on a most elaborate scale. The result of these improvements has been to double the registered tonnage entering and clearing at Hamburg in the ten years from 1880 to 1890, a record of gain almost without equal in the experience of great commercial cities. The port of Montreal has been made accessible to modern vessels by extensive harbor improvements. The revenue for interest, maintenance and management is derived from charges levied on cargoes.

The greater part of New York's vast system of wharves and docks is owned and managed by the municipality. Revenues cllected by the New York Dock Board for the year ending April 30, 1895, aggregated $1,992,547.14.

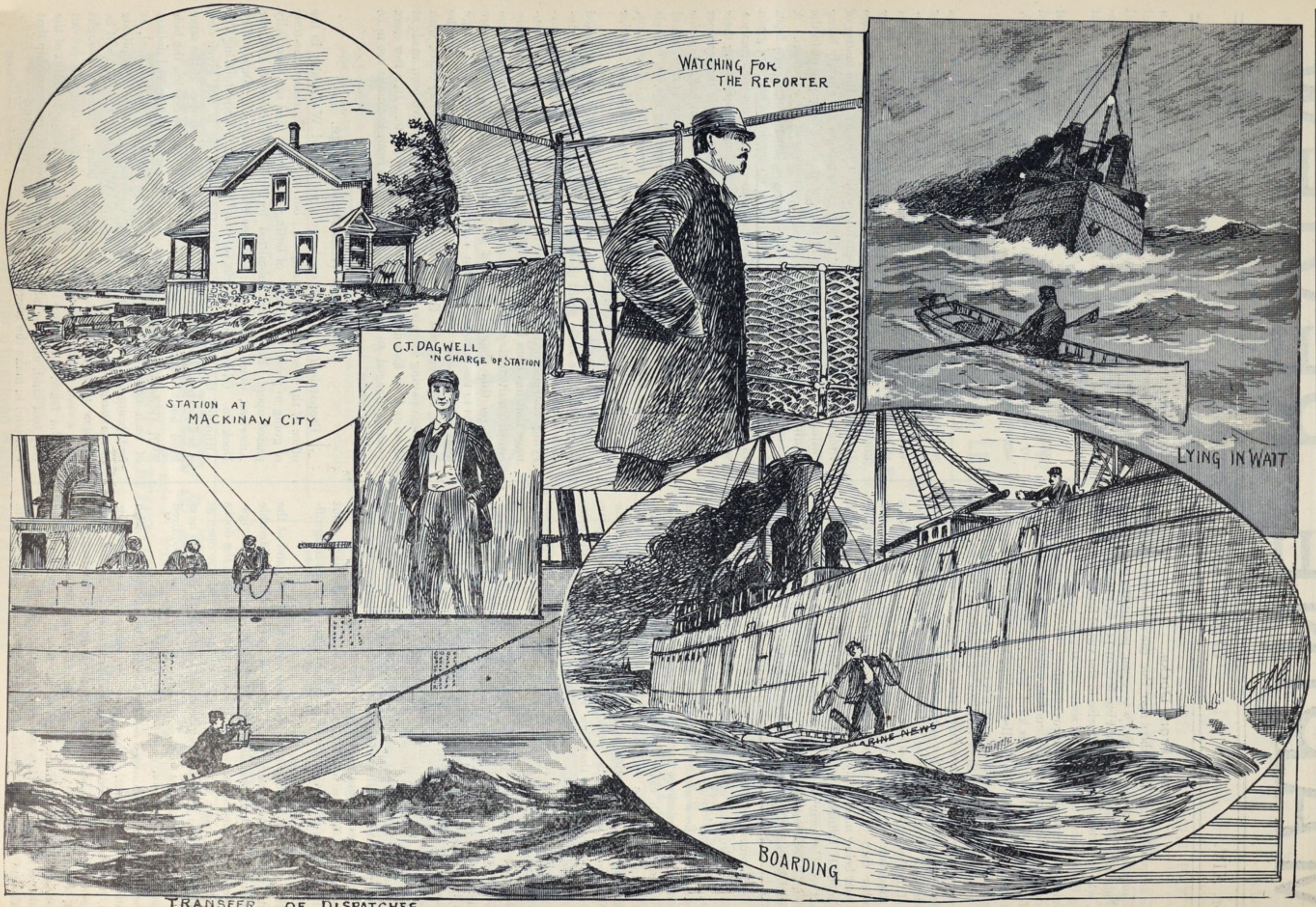
Lake Freights—More Big Cargoes.

It will be remembered that in all of the waterways conventions and gatherings of various kinds intended to encourage the deepening of connecting channels on the lakes the business men of the northwest, and especially those of Duluth and Superior, took a very active part. They were not working without a special object in view. They knew that deep channels throughout the lakes would practically place Duluth and Superior on an equality with Chicago in the matter of freights by water to Buffalo. Their expectations are already being realized. The partial opening of the cut at the Encampment in the Sault river is sufficient proof of the soundness of their reason. A wooden steamer, the Appomatox, has made the passage down from Lake Superior drawing 16 feet 4 inches and carrying a cargo of grain 15,000 bushels in excess of her best previous cargo. This performance will be followed by the big steel steamers gradually increasing their draft as the channel is tested, and it is quite probable that cargoes aggregating nearly 5,500 net tons will be moved from Lake Superior before the season is at an end. The big Queen City is now bound down from Duluth with a cargo of grain comprising 134,000 bushels of wheat and 42,000 bushels of rye, which is equal to 5,196 net tons, or 486 tons more than has ever before been moved from Lake Superior and this on a draft of only 15 feet 6 inches.

This increased draft comes just at a time when it was expected there would be some profit in fall freights. It will have some influence in checking freights, but the greatest drawback to profitable carrying charges for the balance of the season is the movement of tonnage that has been in ordinary. Although sales of non-Bessemer ore are still quite active, and the movement of ore will be increased somewhat on this account, it is not probable that the response in the ore business to the advance in grain will be sufficient to care for the large amount of tonnage that is again coming into commission. For the present, however, the Duluth wheat rate is holding to 2¼ cents, with Chicago paying 2 cents on corn, and ore charters have been made at 65 cents from Escanaba and 75 cents from Marquette. In a few cases vessels engaged to make two or three trips from Escanaba are to be paid 70 cents.

The New Rockefeller Barge.

Proposals for a steel tow barge were opened Wednesday in the office of the Bessemer Steamship Co., but at noon Thursday, the time of going to press, the matter of letting a contract had not been fully passed upon. Bids were submitted by F. W. Wheeler & Co., the American Steel Barge Co., Chicago Ship Building Co., Detriot Dry Dock Co., Globe Iron Works Co., and Cleveland Ship Building Co. Although the figure contained in the lowest bid is not given out, it is known to be very much below prices paid for barges of the same kind built during the past winter. With one exception the bids were very close, several of them being within a few hundred dollars of each other. The boat is to be 380 feet over all, 366 feet keel, 44 feet beam and 28 feet hold. In dimensions she is to be a duplicate of the barge Nasmyth, built by F. W. Wheeler & Co., but will be stronger than any steel tow barge on the lakes. Strength is sought with a view to taking advantage of the deeper draft that will prevail on the lakes. A clause in the specifications calls for an outfit of the very best kind, and for all reasonable features of workmanship that will tend to make the barge complete in every particular.



HE HAILS ALL SHIPS—SERVICE OF THE MARINE REPORTER ON THE LAKES.

Drawn by G. A. Coffin of Chicago.

Views having reference to the station of the Lake Marine News Association at Mackinaw. A risky life that involves great service to vessel owners, as well as relatives and friends of men employed on lake ships.

The Lake Marine Reporter.

A collection of views on the opposite page illustrates the work of the marine reporter on the lakes. The sketches were made by Geo. A. Coffin of the Chicago Tribune and have reference to the Mackinaw station of the Lake Marine News Association, of which Homer J. Carr, Western Union building, Chicago, is general manager. This associaton ,which has succeeded in systamatizing the extensive work of furnishing general marine news and reports of vessel movements to newspapers throughout the lakes, now maintains its own stations at Mackinaw, Detour and Sault Ste. Marie, and uses the reports of Lynn and Westcott, who have for a great number of years past carried on a business of the same kind at Port Huron and Detroit, respectively. At Mackinaw, Detour and the Sault the Lake Marine News Association conducts also with vessel owners a commercial business in the delivery of messages and in furnishing direct information of all kinds. This branch of the business has developed with the Chicago organization as a necessary adjunct to the newspaper service, and the thorough manner in which it has been undertaken is indicated by these views of the station at Mackinaw, where the work is most difficult.

Answers Mr. Coryell.

Editor Marine Review:—As the articles appearing in your paper, issues of Oct. 1 and 8, from Mr. Miers Coryell, regarding the trouble on the Northern line steamers North Land and North West appear to be aimed directly at the engineers in charge of said steamers, I would like the privilege of explaining our side of the subject through the medium of your valuable paper. I wish to state that the instructions furnished me last spring by Mr. Coryell were read to the special men in charge of the fire-room, and copies of the instructions were given them to read to the firemen, and that I made personal inspec tion frequently to see that instructions were carried out according to Mr. Coryell's orders.

Rule No. 9 was enforced as strictly as possible, but every engineer on our lakes knows how difficult it is to have their firemen fire as light as they should, even when they have only two or three men to handle, and when the fact that on these boats we had from forty to fifty firemen to look after on each round trip between Duluth and Buffalo is taken into consideration, I think my brother engineers will agree with me that it would be a big contract to watch them and force them to adhere strictly to this rule.

Rule No.13 was disregarded for the reason that the automatic feeders could not be kept in working order. If the stems were allowed to leak ever so little there would form a scale or corrosion, that would very shortly stop them, and on the other hand, if stems were packed sufficiently tight to prevent leaking, the friction of packing would not allow them to work, so rather than run any risk of burning my boilers I discontinued the use of the automatic feeders (which were not automatic) and used the graduating feed cock entirely.

Rule No. 15 was not as closely followed as instructions called for, because if the men took from ten to fifteen minutes every two hours to scrape the tubes, the boat would be out in the lake yet waiting for steam to bring her into port.

Mr. Coryell, in concluding his article, indulges in wholesale criticisms of the practices which he says prevailed on the boats. I would like to know how he knows of such "practices?" Did he wait on the dock to question discharged and dissatisfied men, or does he guess at it? He was on my boat (North Land) only once during the season, and then for a few hours only between Buffalo and Detroit. He surely could not judge of our actions in that short time. These "practices" did not prevail, because we could "not prevent" but were immediately stopped as soon as discovered. The ash discharge pumps were never used without a mixture of water, for the simple reason that it would be impossible to make them work without water, and as to the fire-rooms being 18 inches deep with ashes and clinkers, I wish to say that his statement in this matter is a wilfull misrepresentation. The floor of the fire-room on the North Land was always clean when she entered port, and that is the only condition in which Mr. Coryell could have seen her during the past season. He also states that as a result of disregarding paragraphs 16 and 17 the boilers were often overfull of water, but that "the engineer said it made no difference, as no water went over into the engines." This I denounce as another wilfull misrepresentation, as when the boilers were overfull of water it not only proved a nuisance to everyone on or around the ship, but was disastrous to some of the auxiliary machinery, particularly the dynamo engines, and for that reason myself and assistants were always on the watch to keep the water at a normal height in the boilers.

The whole amount of the thing is this: Mr. Miers Coryell is trying to advertise his worthless French patents at the expense of the reputations of men who have spent a life-time gaining a practical knowledge of machinery, such as he evidently does not possess. Now if he is so anxious to prove to the public that the mishaps to his machinery were due to the incompetency of the engineers, let him take charge of one of the boats next season, and if he can make as good a record with his boat as the North Land made this season, I will be one of the first to give him the credit he will then deserve.

R. E. Walker,
Late chief engineer of the North Land.
1255 West avenue, Buffalo, N. Y., Oct. 12, 1896.

Story of the Steamer Atlantic.

Editor Marine Review:—When I saw in the Review, some time ago, a statement to the effect that the steamer Atlantic foundered in Lake Erie, I intended to correct the error, but I was in hopes that Capt. L. M. Coe of the Cleveland City Forge & Iron Co. would do so. He was in the Fountain City at the time. Now I see, however, that your correspondent from New Haven, Conn., has set matters right. The Atlantic was sunk at Long point by the propeller Ogdensburg with a big loss of life. The collision was followed by a law suit that was in court for three years. The first hearing cleared the propeller. Then the case was taken before three judges and they also cleared the propeller. It was finally taken to the supreme court at Washington, D. C., and here the Ogdensburg was declared liable for the loss. In the meantime affairs of the Northern Transportation Co., owners of the Ogdensburg, had been changed, and it was understood that Ward of Detroit, who owned the Atlantic, had to pay the cost of the suit. An express company had $75,000 in a safe on the Atlantic. Two wrecking companies made unsuccessful attempts to raise her. One of them employed a Cleveland diver, a Mr. Green, who owned a diving suit, and who managed to get the safe out of the office of the boat, but before anything farther could be done towards raising her, he was hauled up paralyzed. Buffalo parties tried to raise the boat later on but failed to do so. Diving suits were not plentiful on the lakes in those days. At St. Catherines, Ont., there was a lock tender who could go down in 18 feet of water and drive a 5-inch spike without diving apparatus of any kind. The express company announced a willingness to make liberal payment to any one who would recover the safe on the Atlantic, so "Dick, "the lock tender, went up to Long point and upon a second dive got the safe on the guard. Going down a third time he hooked onto it and it was hauled up. They gave him the magnificent sum of $1,000 for reclaiming $75,000 for them. They had hearts like mice. They might have done better by him. At his work on the canal he was paid only $15 a month and had to board himself. If he repaired a hole in a gate occasionally he got an extra dollar for the job. In going after the safe on the Atlantic he had on only a shirt and pants but went down 55 feet. Thus it will be seen that St. Catherines turned out the greatest diver in the world. I often told "Dick" in passing through the canal that he would never die for want of wind. A conundrum was passed around after the Atlantic was sunk. "Why is Lake Erie larger than the ocean?" was the question. The answer was: "Because it swallowed up the Atlantic."

Sombra, Ont., Oct. 12, 1896. Charles Gale.

(The writer of the above communication is one of the oldest of the lake captains of early days now living. He retains a great interest in affairs of the lakes and up to a few years ago made regular contributions to the columns of lake papers. Of late he has complained of an unsteady hand and other difficulties in writing, but this story of the Atlantic is certainly interesting.—Editor.)

It would certainly seem that pig iron production has been reduced to a point below the present consumption, and considerably below the increased consumption that will show itself in the next few weeks through works starting up in various parts of the country. The weekly capacity of all pig iron furnaces in the United States on Oct. 1 was only 112,782 gross tons, as against 217,306 tons on Nov. 1 last.

Reduced rate tickets are offered for sale by the Nickel Plate road to points in Michigan, Wisconsin and the southwest for the benefit of hunting parties. 337 Nov. 1.

How To Get a 24-Knot Ship.

A very interesting paper treating of further development in the fast Atlantic liners was presented by Arthur J. Maginnis at a meeting of naval architects in Liverpool recently. There are, he said, only six Atlantic liners sailing under the British flag, which, taking speed as a criterion, may be classed as thoroughly or approximately up to date. Of these, four belonged to the Cunard line and two to the White Star line. The gradual development of express passenger service at high speed in ships carrying but little cargo began with the Cunard service in 1881. To attain and maintain high speed in ocean-going vessels it is necessary to increase their size and weight of hull in direct ratio with speed in order to keep down the engine power required. As showing the progress made in machinery, it may be stated that in 1880 one pound of fuel burned on a cargo vessel would transport a net earning weight of 1.05 tons a distance of ten knots within an hour; in 1890 this was increased to 1.93 tons and in 1896 to about two tons. Another basis was required for high speed vessels, and the author of the paper, commencing with the Oregon in 1883, showed the consumption of coal required to propel a vessel from 19 to 21½ knots. Assuming for the sake of comparison that the triple engines represent 25 per cent. saving in consumption over compound, he reduces the different results to terms of the triple engine as follows: Oregon 12,500 tons displacement, propelled 19 knots by 9.4 tons coal per hour; Umbria, 13,300 tons, 19½ knots by 10.1 tons coal; Teutonic, 16,740 tons, 20 knots, by 12 tons coal; Campania, 21,000 tons, 21½ knots by 20 tons coal. If the allowance of coal per indicated horse power be taken as 1.3 pounds per hour the additional indicated horse power required to increase from 19 to 19½ knots would be 1,200; from 19 to 20 knots, 4,480; and from 19 to 21½ knots, 18,264, or considerably more than double.

Mr. Maginnis thinks that the time is now ripe for a new departure in the whole system of Atlantic liners and their machinery, similar to that made by the Inman line in 1850, the White Star line in 1871, and again by the Inman and International in 1889. It seems impossible, he said, to believe that the marine engineer and naval architect have won their last triumphs on the Atlantic ferry. It is admitted that if it be a nescesary condition to adhere to existing practice in building the hull and machinery the problem is scarcely soluble just yet, as the machinery would be of unheard of dimensions, and in order to find room for it and all the additions which are now thought essential, the hull would have to be at least 700 feet long between perpendiculars by 74 feet beam and proportional depth, which at 28 feet draught would mean at least 30,000 tons displacement. The indicated horse power required to obtain 23 to 24 knots would be, say, 46,000, equal to a daily consumption of 600 tons, and a machinery weight, with bunkers, of over 9,000 tons. Such a vessel would cost something like $4,000,000.

By revising the practice in constructing the machinery, and by bringing up to date the regulations of the British board of trade in accordance with the most modern experience, it is possible, he says, that 23 or 24 knots might be attained without necessitating such huge vessels and such enormous outlay. The machinery and boilers in war vessels, for instance, have been gradually reduced in weight per indicated horse power, almost one-half, by the adoption of improved designs and materials, especially by reduction of thickness of the boiler shells. Spare gear and fittings could be cut down, or materials reduced or done away with, etc., which, if combined with the naval form of machinery, would render it possible to make use of a hull having moderate dimensions, say 600 feet between perpendiculars, by 63 feet beam, with a displacement of about 19,000 tons at load draught, so that about 40,000 indicated horse power would probably be sufficient, with a daily consumption of 420 tons, or somewhat less than that of the Campania. Another advance, he said, could probably be made, as the more powerful machinery would, together with the coal in bunkers, only absorb 37 per cent. of total displacement, against 47 per cent. on the Campania, and as the increase of indicated horse power would be largely gained by a still further advance in the piston speed, ample space would be available for either two or three sets of machinery, according as two or three propellers might be adopted. The hull of such a vessel would cost about $1,200,000, and the machinery $2,000,000.

A new pilot boat for the Delaware river and bay will be built by the Harlan & Hollingsworth Co., Wilmington, Del.

A Photographic Enterprise.

The Marine Review has in hand the results of sending a photographer to the mouth of the Detroit river, where he remained two weeks and several days taking photographs of representative lake steamers. Some sixty 11x14-inch negatives have been secured, and from them we are having prints made and mounted on 14x17-inch cards, making the handsomest photographs of lake steamers yet published. Orders have been received for a large number of these photographs, and within a few days single prints of the sixty views will be ready for inspection at the Marine Review office, Perry-Payne building, Cleveland. Any one who orders by mail and is not satisfied with the pictures may have their money refunded. The price for single prints is $1.50 or four prints to one address for $5. In addition to the views of the different boats, there is a panoramic view 11x28 inches, showing Bois Blanc island, the channel, Amherstburg, Lime-Kilns crossing, etc. This is one of the prettiest and best known views on the lakes, and the photographer does it justice. No finer picture for the home of a marine man can be imagined. The price of this picture is $3, and it will be furnished with a neat matt and frame around it for $5. Following is a list of the vessels photographed:

Senator,
Fairbairn,
State of Michigan,
Commodore,
Mohawk,
Pontiac,
Spokane,
Emily P. Weed,
Centurion,
Edwards and barge,
I. W. Nicholas,
J. J. McWilliams,
Kearsarge,
Chas. S. Parnell,
Geo. N. Orr,
Owego,
Iron King,
Frank E. Kirby,
Geo. Spencer and barge,
Chili,
Tuscarora,
Geo. Presley,
North Land,
Scranton,
Majestic,
Masaba,
Sir Henry Bessemer,
Schuylkill,
Thos. Cranage,
S. S. Curry,
Stafford,
H. R. James,
Maricopa,
Zenith City,
Northern Light,
Bartlett and two whalebacks,
Republic,
Yale,
Italia,
Harlam,
Wm. Chisholm,
City of Genoa,
Gladstone ,
Frontenac,
Marina and barge,
L. C. Waldo,
J. H. Devereaux,
Eber Ward,
Connelly Bros.,
John Harper,
Iosco,
Fred Pabst,
Tom Adams,
Hesper.

Increase in Working Pressures of Marine Boilers.

A remarkable increase in the working pressure of marine boilers is shown in the following table. It was presented recently at a meeting of naval architects and marine engineers in London, with a view to showing that the limit is being reached in the Scotch boiler and that some new type, very probably the water tube boiler, must soon come into general use:

TABLE SHOWING INCREASE OF PRESSURES IN MAIN BOILERS OF VESSELS CLASSED IN LLOYD'S REGISTER (BRITISH) IN 1885 AND 1895.

Boiler Pressure.	Number of Vessels, 1885.	Number of Vessels, 1895.
Below 60 pounds	122	40
60 pounds to 70 pounds	673	217
70 pounds to 80 pounds	1,326	666
80 pounds to 90 pounds	1,650	1,101
90 pounds to 100 pounds	346	397
100 pounds to 110 pounds	102	321
110 pounds to 150 pounds	33	213
150 pounds to 160 pounds	34	517
160 pounds	14	2,200
Above 160 pounds	3	416

The special race for power launches at the second annual regatta of the St. Louis yacht club had three entries, but one withdrew and another was not ready, so the Ouatoga of the Illini yacht club went over the course, six miles up and six miles down stream, winning the club challenge cup and the Fred Medart cup. Mr. Medart is a launch builder and offered the cup to arouse interest in launch racing. The course of twelve miles was covered by the Ouatoga in forty-one minutes.

Four Important Light Stations.

In their dealings with the United States light-house board and with congress during the next session, Secretary Keep and Treasurer McKay of the Lake Carriers' Association will be provided with some very strong arguments supporting claims for new lights and fog signals. In the list of new aids to navigation agreed upon by the association there are four points at which stations of a costly kind are proposed. These are Middle island, St. Martin's reef and Scarecrow island on Lake Huron, and Crisp's point, Lake Superior. On account of the large appropriations that will be required for these stations, the officers of the association have been collecting information pertaining to them from vessel masters, and the arguments thus produced are embodied in Secretary Keep's letter of recent date to the board. Of the Middle island light he says:

"Middle island is a point where the lake interests have for several years asked for a light. So far, however, the light-house board has never approved our requests, but we think this is largely due to a misconception on their part as to the purpose of the proposed light. So far as our conversations and correspondence on this subjcet with Commander Folger, the present district inspector, have gone, the point which he makes against a light on Middle island is the fact that it is not needed as a coast light, there being other coast lights near it both to the north and south. In view of the very numerous accidents that have taken place on Middle island (I furnished the light-house board in a printed brief a list of about twenty of these accidents which occurred prior to June, 1894), and in view of the fact that abreast of Middle island is the turning point where vessels north bound shape their course either for Detour and St. Mary's river or for the Straits of Mackinaw, a light on Middle island would be useful even as a coast light. The argument for the light, however, does not rest there. Behind Middle island there is a most valuable harbor of refuge. Commander Folger points out that there is another harbor of refuge at Presque Isle, near by, but Presque Isle, notwithstanding its range lights and the fact that it was once a valuable harbor of refuge, is absolutely worthless as a harbor of refuge to vessels of the present day. The large vessels now built can not and do not use Presque Isle for refuge. There is, however, a natural harbor of refuge under Middle island, which is now even used very largely in the day time, and which would be used at night if the Middle island light were established. With a light on Middle island vessels would also use False Presque Isle as another harbor of refuge. The old Presque Isle harbor can only be used now by small coast traders. It is entirely too shallow in all its parts for large vessels, and even if vessels got into it, they would not have room to work around to get to an anchor. The absolute uselessness of the Presque Isle harbor of refuge is well understood by all vessel masters. With a light on Middle island vessels south bound would take shelter in great numbers under the island from heavy easterly and southeasterly winds, and vessels bound northward encountering heavy northerly or westerly winds would find this light a sure guide to shelter under False Presque Isle. The two natural harbors, False Presque Isle and lee of Middle island, would be available at all times and for vessels of all kinds. Our talk with Major Adams on this subject has, we think, convinced him that a light on Middle island is highly necessary, and we are entirely satisfied that when Commander Folger has had time to get thoroughly acquainted with the conditions prevailing in this locality, he will be of the like opinion."

The proposed light on St. Martin's reef is needed as an aid to the very greatly increased traffic between the mouth of the St. Mary's river and the Straits of Mackinaw. The commerce between Lake Superior and Lake Michigan was formerly small, but since the great development of the Illinois Steel Co.'s works at Chicago, Milwaukee and Joliet, and the discovery of new and cheap ores, suitable for making steel, on the northerly shore of Lake Superior, the commerce passing from the mouth of the St. Mary's river through the Straits of Mackinaw into Lake Michigan has grown very rapidly. It is at least four times what it was five years ago, and the vessels employed in carrying ore from Duluth and Two Harbors to Lake Michigan ports are of the very largest class in the lake marine. The course of the vessels passes close to St. Martin's reef, and a light there is much needed. It has the hearty support of the district officers."

The light at Scarecrow island is sought by the interests engaged in traffic to and from Alpena, Mich., and northward out of Saginaw bay. The latter would be especially benefited by this light during the westerly and northwesterly gales when vessels are compelled to run close to the west shore of Lake Huron and Thunder bay. The passenger traffic in this part of Lake Huron is also very large. The large and important passenger traffic carried on by the Detroit & Cleveland Steam Navigation Co. between Detroit and Mackinaw island, with stops at all important ports on the west side of Lake Huron, would find a light on Scarecrow island a very valuable protection to life and property.

Crisp's point is about seventeen miles west of Whitefish point. It is the first piece of land picked up by vessels east-bound on Lake Superior, and approaching Whitefish point near the head of St. Mary's river. The coast at this point is rocky and dangerous, and vessels need to determine their exact position in approaching Whitefish point. Better than a light at Crisp's point would be a light ship off the coast, but such a light-ship would be in so exposed a situation that it would be very expensive, and a light and fog signal on Crisp's point would be cheaper to build and to operate and would answer the purpose. The proposed fog signal is even more necessary than the light at this point. When the weather is clear the light at Whitefish point can be seen in time, but in foggy weather, and in snow storms, which in the fall of the year are very common on Lake Superior, and in times when the atmosphere is heavily charged with smoke from forest fires, a sound signal west of Whitefish point informing vessels of their proximity to the rocky shores of Lake Superior is highly necessary.

Ship Yard Matters.

It is again announced that the Graham & Morton company of Chicago will have a big passenger steamer built during the coming winter, and that the contract will probably go to the Detroit Dry Dock Co., but there is still a great deal of doubt about this boat. It is quite generally known that the Graham & Morton company has been trying to buy a certain steamer now in service on the lakes. If they buy this boat they will, of course, do no building, but they must have another boat for next season and will certainly build if their terms of purchase on the boat referred to are not accepted. Silence regarding plans for the new side-wheel steamer for the Cleveland & Buffalo line is probably due to the condition of the money market, and there will probably be nothing definite about this contract until after election. Some one of the Canadian builders, probably the Hamilton Bridge Works, will, however, have two big side-wheel steamers to build for the Richelieu & Ontario Navigtion Co., as there seems to be no question regarding the building of these boats. The Richelieu & Ontario directors at their last meeting in Montreal declared the usual haif yearly dividend of 3 per cent., payable Nov. 2, and decided to build for the Toronto-Prescott service two side-wheel steamers of steel, to be not less than 275 feet in length and of high speed.

The second job of repairs on the steamer William Chisholm, which is in the dock of the Cleveland Dry Dock Co., and which will probably be out tonight (Thursday), will involve an expenditure of about $12,000. It includes the removal of forty-two bottom plates, twenty-four of which had to be replaced by new plates; also seventy-four new floors and the same number of new frames and frame straps, as well as a center keelson angle 36 feet long, and thirty new girder stiffeners. This job was done in ten days, and the foreman, John Douglas, is accordingly credited with rapid work.

A notice from the Canadian marine department directs attention to the wrecks of the schooner Macy and steamer Cottrell, sunk near the mouth of the Detroit river. The Macy lies on her beam ends in 3½ fathoms, 1,250 feet E. S. E. from Detroit river light-house. A light is maintained on the hull and steps are being taken for its removal. The Cottrell is about 5,200 feet N. E. by E. from Detroit river light-house. She lies in 3¼ fathoms about 400 feet east of the dredged channel and between the first and second red buoys north of the light-house. The top of her mast, with standing rigging shows above water. She is out of the deep-water channel, but is in the track of light draught vessels entering or leaving the Detroit river.

It is announced officially that Capt. Robley D. Evans, commanding the Indiana, is to be detached from that ship and transferred to the light-house board, where he will succeed Capt. John R. Bartlett, whose term of shore service has expired.

MARINE REVIEW

DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

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Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1895, contained the names of the 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598.72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

	Number.	Gross Tonnage.
Steam vessels	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged	487	83,081.91
Total	3,342	1,241,459.14

The gross registered tonnage of the vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891	204	111,856.45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
Total	347	335,433,98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (*From Official Reports of Canal Officers.*)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about ¼ per cent. of the whole, but largely in American vessels.

Prof. Biles, famous as the designer of the steamers Paris and New York, puts together in an unique way, in a recent magazine article, some facts referring to the Atlantic greyhound of the future. "The great objections raised by the sea to high speed may best be appreciated," he says, "if I state the increase in power required to drive the present day ships at their 22-knot speed, compared with the 8-knot ships of fifty years ago. Engineers measure power by a unit, which is called a horse power; but horses vary in strength. If you could find a horse which could lift just 33,000 pounds through a foot in a minute, it would have just the power necessary to be a measurer of the engineer's horse power. Now, in the 8-knot ships the power was equal to 700 times that of your particular horse, while in the Campania and Lucania the power is equal to about 30,000, more than forty times as much. So you see how much more objection the sea has to a 22-knot speed than to one of 8 knots. Of course, the ships that have so much more power have to be bigger, but not so much bigger as they would have had to be had there not been a constant improvement in engines and boilers, which has enabled engineers to get so much more horse power in the same space and for the same weight than used to be got, and also to get this horse power for so much less weight of coal. To give you some idea of this difference, I will tell you of two cases during the decade of 1880-90. The first Cunard steamship completed in that decade had machinery of one-half the power of that of the Paris, which was completed in 1889. If we say the weight of her machinery is represented by 2,000, then the Paris would have been 4,000, unless some improvement had been made. But the Paris's is represented by only 2,800. These figures may be taken approximately to be tons, so that there was actually about 1,200 tons less weight than would have been had no improvements been made for double the power of the older ships. Then as to coal burned. For every four pounds burned in the older ship only three are required in the Paris to produce the same power. The Paris burns about 2,400 tons in crossing the Atlantic. She would have had to burn 3,200 tons, unless improvements had been made. Here then we see that to produce the power which is in the Paris on the old lines of only fifteen years ago would have involved 1,200 tons more for machinery and 800 tons for coal or 2,000 tons more in all. This weight is much more than the weight of the whole of the cargo of the Paris, so that without the engineer's improvements the poor Paris would have to go without cargo of any kind, which is an important consideration in the money-making capabilities of a ship."

Mr. Carnegie is quoted as saying that he expects to make his investment in the new ore railway from Conneaut to Pittsburg return a fair profit on a basis of 3 mills per ton-mile, or about 45 cents for hauling a ton of ore from lake docks to furnaces. This means that other railways carrying ore between Ohio ports and Pittsburg will be forced to protect their customers, who are competing with Mr. Carnegie, and the result will be a marked reduction in the rail charges of ore. This reduced rail charge will still further enable Pittsburg to meet prices of other iron and steel districts, but it only tends to direct attention to the fact that Erie, Cleveland and other points on Lake Erie are best suited to the manufacture of pig iron, and in fact to the whole iron industry. It is only a matter of a little time until this statement will be verified.

The Army and Navy Journal quotes Gen. Thos. W. Hyde as saying that the two torpedo boats which the Bath Iron Works has recently contracted to build for the United States will be constructed upon plans obtained from the most successful builder of torpedo boats for the French government loaned with the consent of the naval authorities of that country. Gen. Hyde believes the French have been more successful constructors of torpedo boats than any other European nation.

There is considerable pride in knowing that 226 steel and iron vessels of 380,987 gross tons are owned on the lakes. But how small these figures seem when contrasted even with new ships under construction in England and on the Clyde. On Sept. 30 last the number of vessels under construction in the United Kingdom, excluding war ships, was 355 of 659,641 gross tons, of which all but 5,000 tons was steel.

Duty of Colliding Vessels to Stand by Each Other.

A law passed by congress in September, 1890, makes it the duty of colliding vessels to stand by each other and render assistance and give their names in all cases where the circumstances are such as to render it proper and reasonable, and further provides that a failure to do this will render the offending vessel in fault as causing the collision, in the absence of proof to the contrary. This law recently came up for construction in the case of the Boston Towboat Co. vs. Winslow and others, decided by the United States circuit court of appeals for the first circuit. It appears that a collision occurred between a schooner owned by appellees and two barges towed by a tugboat owned by the appellant; that both barges and the schooner were damaged; that the owners of one of the barges filed in New York a libel against both the schooner and tugboat; that the owners of the schooner libeled the tug in the district of Massachussetts, and that the owners of the tug filed a petition to limit their liability, while contending at the same time that the collision was due to the fault of those in charge of the schooner, and that the tugboat was not liable to either the owners of the schooner or the barge. It further appeared that the district court in Massachusetts entered a decree limiting the liability of the owners of the tugboat to the amount of value of the interest in the tug and her freight money or towage then pending. The damages decreed to the barge and to the schooner did not together equal the value of the tug and her pending freight. From this decree the petitioners, the owners of the tugboat, as well as the owners of the barge and schooner, appealed. The appellate court affirmed the decision of the court below, and said: "The evidence is uncontroverted that after the collision the schooner proceeded on her course without stopping to see if any assistance was required by the barge, and without giving her name, hailing port or port of destination, and the appellants contend that for such omissions she should be held to have been in fault, according to the statute of Sept. 4, 1890. There was nothing in the evidence disclosing on the part of the schooner's captain any indifference to or reckless disregard of his duty towards the vessel with which he had collided, and this court can not say that, in view of all the circumstances surrounding him, he was not warranted in believing that he had ascertained that no further assistance was necessary. * * * We do not think, upon the evidence now before us, that the Jacob S. Winslow should be condemned under the act of Sept. 4, 1890. If she is to be held liable at all it must be because of some fault in her navigation contributing to the collision."

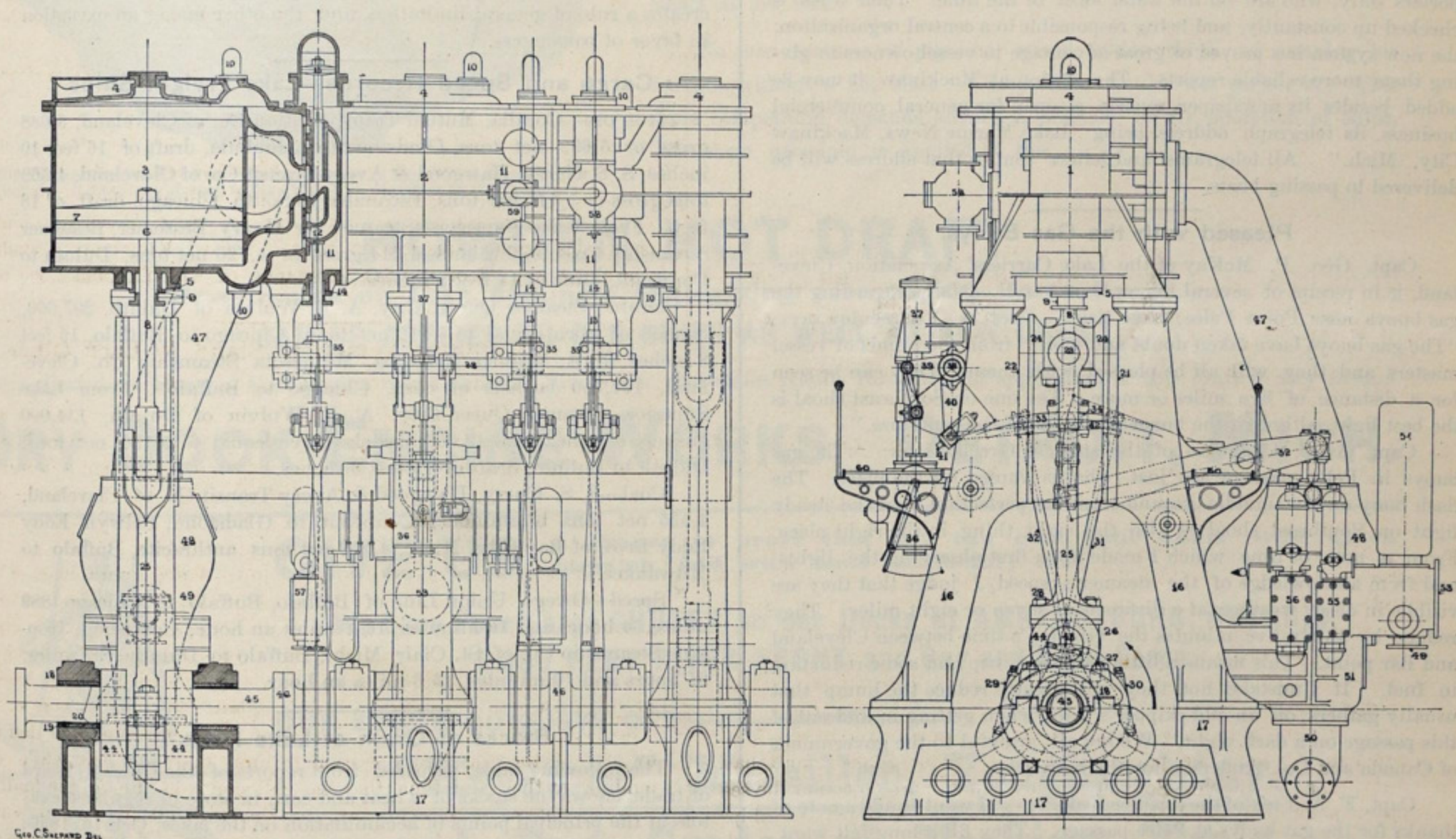
The Nickel Plate road offers excursion rates to points in Wisconsin, Michigan and the southwest for hunters. 338 Nov. 1.

To Young Engineers.

Wm. D. Edwards of Worcester, Mass., says in a letter to the Review: "Will you kindly inform me as to requirements in the matter of obtaining a marine engineer's license, and let me know of what value a technical engineering education is in this regard, taking for example the course in mechanical engineering at Worcester Polytechnic Institute, which is regarded as one of the first as to standing, in the United States. I expect to graduate from the institute next spring, and wish to know where and in what position the sea experience, if any is required, can best be obtained."

For the benefit of this young man, as well as others who may be seeking the information referred to, we quote herewith the section of rules of the United States steamboat inspection service covering his inquiry. A full season on the lakes is regarded as a year of practice:

"No person shall receive an original license as engineer or assistant engineer, except for special license on small pleasure steamers of 10 tons and under, and ferry boats, sawmill boats, pile-drivers, and other nodescript similar small vessels, navigated outside of ports of entry and delivery, who has not served at least three years in the engineer's department of a steam vessel, which experience must have been obtained within two years preceeding the application; provided that any person who has served regular apprenticeship to the machinist trade in a marine engine works for a period of not less than three years, and any person who has served for a period of not less than three years as a locomotive engineer, stationary engineer, or as an apprentice to the machinist trade in a locomotive or stationary engine works, and any person who has graduated as a mechanical engineer from a duly recognized school of technology may be licensed to serve as an engineer on steam vessels after having had not less than one year's experience in the engine department of steam vessels, which experience must have been obtained either within one year before or one year subsequent to the acquisition of the skilled knowledge above mentioned, (which fact must be verified by the certificate in writing of the licensed engineer or master under whom the applicant has served, said certificate to be filed with the application of the candidate); and no person shall receive license as above, except for special license, who is not able to determine the weight necessary to be placed upon the lever of a safety valve (the diameter of valve, length of lever, distance from center of valve to fulcrum, weight of lever, and weight of valve and stem being known) to withstand any given pressure of steam in a boiler, or who is not able to figure and determine the strain brought on the braces of a boiler with a given prsesure of steam, the position and distance apart of braces being known, such knowledge to be determined by an examination in writing and the report of examination filed with the application in the office of the local inspectors; and no engineer or assistant engineer now holding a license shall have the grade of the same raised without possessing the above qualifications. And no original license shall be granted any engineer or assistant engineer who can not read and write and does not understand the plain rules of arithmetic."



DRAWING INDICATING PARTS OF THE MODERN TRIPLE EXPANSION MARINE ENGINE.

[From Blue Book of American Shipping.]

1 H. P. Cylinder. 2 I. P. Cylinder. 3 L. P. Cylinder. 4 Cylinder cover top. 5 Cylinder cover bottom. 6 Piston. 7 Piston packing ring 8 Piston rod. 9 Piston rod stuffing box. 10 Relief valve. 11 Valve chest. 12 Valve. 13 Valve stem. 14 Valve stem stuffing box. 15 Valve stem counter balance. 16 Column. 17 Bed Plate. 18 Main journal cap. 19 Main journal brass bushing 20 Main journal babbit lining. 21 Go ahead slide. 22 Backing slide. 23 Crosshead pin. 24 Crosshead shoes. 25 Connecting rod. 26 Connecting rod top brasses. 27 Connecting rod bottom brasses. 28 Connecting rod bolts. 29 Go ahead eccentric. 30 Backing eccentric. 31 Go ahead eccentric rod. 32 Backing eccentric rod. 33 Stephenson link. 34 Stephenson link block. 35 Valve stem guide. 36 Reversing engine. 37 Reversing engine oil cylinder. 38 Reversing shaft. 39 Reversing arms to engine. 40 Reversing arms to links. 41 Adjusting screw. 42 Suspension rods. 43 Crank pin. 44 Crank web. 45 Shaft. 46 Shaft couplings. 47 Exhaust pipe. 48 Condenser. 49 Injection valve. 50 Channel plate. 51 Air pump. 52 Air pump beam. 53 Air pump discharge. 54 Air pump air chamber. 55 Feed pump. 56 Cooler pump. 57 Bilge pump. 58 Main throttle. 59 Auxiliary throttle.

New Lights and Fog Signals.

The efforts of the Lake Carriers' Association in behalf of aids to navigation during the past two or three years are being realized in the actual establishment of new lights and fog signals. About Oct. 20, a 10- inch steam fog whistle, which will sound blasts of five seconds' duration separated by silent intervals of fifty-five seconds, will be established in the light station on Round island, straits of Mackinac.

A new light and fog-signal station at Big Bay point, south side of Lake Superior, above Marquette, will be in operation about Oct. 20. The light is of the third order, showing fixed white varied by a white flash every twenty seconds. It is 108 feet above the mean lake level and may be seen 18¾ miles in clear weather. Stanard rock light is N. E. ¼ N. from Big Bay point, distant 32 miles; Granite island light S. E. by E. ⅛ E., distant 15½ miles, and Huron island light N. W. by W. ⅜ W., distant 17¼ miles. Blasts of the steam fog whistle will be of three seconds' duration, separated by silent intervals of 17 seconds.

Vessel Reports from Mackinaw.

An interesting series of pictures illustrating the work of marine reporters at Mackinaw appears elsewhere in this issue. But the picturesque features of vessel reporting are of no great interest to vessel owners. What they demand is to have their boats reported at the proper hour. In this respect, the service which the Lake Marine News has established at Mackinaw City this season has been highly satisfactory. The reports contained in the daily papers, particularly since fall winds commenced to blow, greatly excell the reports of past seasons. From day to day, passages at Mackinaw City have proved remarkably full and accurate. Vessel men can now figure to a large extent that if their boats are not reported at Mackinaw they are still on either side of that point. Of course, it will be impossible under any service to obtain absolutely perfect results, but the thoroughgoing system of the Lake Marine News has succeeded in attaining a far higher percentage of boats reported than has ever been reached before in this service. This was secured by the employment of veteran reporters only, who are on the water most of the time. Their work is checked up constantly, and being responsible to a central organization, the new system has proved of great advantage to vessel owners in giving them more reliable reports. The station at Mackinaw, it may be added, besides its newspaper reports, is open for general commercial business, its telegraph address being "Lake Marine News, Mackinaw City, Mich." All telegrams and letters sent to that address will be delivered to passing boats.

Pleased with the Gas Buoys.

Capt. Geo. P. McKay of the Lake Carriers' Association, Cleveland, is in receipt of several letters from vessel captains regarding the gas buoys near Point Pelee, Lake Erie. Capt. A. J. Greenley says: "The gas buoys have taken doubt and worry from the minds of vessel masters and they will all be pleased with them. They can be seen for a distance of five miles or more. The one on Southeast shoal is the best light, although the burners may be of the same size."

Capt. A. C. Chapman of the steamer Grecian says: "The gas buoys in Pelee passage are just what is wanted for the place. The flash buoy on the middle ground works to perfection, and the steady light on Southeast shoal is also the right thing in the right place. From a note of time which I made upon first observing the lights, and from a knowledge of the steamer's speed, I judge that they are visible in clear weather at a distance of seven or eight miles. They reduce by thirty-five minutes the Grecian's time between Cleveland and Bar point. This means a little gain on a trip and some reduction in fuel. If I mistake not, they will greatly reduce the hump that usually gathers on an old skipper's back when getting in and out of this passage on a dark night. We are all grateful to the government of Canada and Col. Anderson for the buoys."

Capt. F. A. Fick of the steamer Fedora: "I want to add a note of thanks for the gas buoys at Pelee passage. They fill a long-felt want. The two spots marked by them were the two worst unmarked places on the lakes. I saw them at a distance of full five miles on a night that was dark but clear."

Officials of the Detroit & Cleveland Steam Navigation Co. have sent to the marine department at Ottawa reports from their captains commending the buoys very highly. They also report that the lights can be seen in clear weather at a distance of full seven miles.

Regarding Limitation of Liability.

In a case known as the Annie Faxon case (June 15, 1896) the United States circuit court of appeals for the ninth circuit lays down a broad doctrine as to the "privity or knowledge" of corporations in proceedings to limit liability under sections 4283-4289 revised statutes. It was a boiler explosion case, in which a number of passengers and employes were injured. By the proceedings below, the value of the steamer in her damaged condition, etc., was fixed at $3,520 and the liabilty of the owner limited to that amount. There was negligence in using the boiler in the condition it was found to be, and the appellants urged that this negligence should be imputed to the corporation, charging it with such privity as to take the case without the statute. The court said: "We are unable to see how there can be imputation of privity or knowledge to a corporation of defects in one of its vessels' boilers, unless the defect were apparent and of such a character to be detected by the inspection of an unskilled person." Having in view the purpose of the law, and the liberal construction called for and given in the furtherance of that purpose, "it is sufficient if the corporation employ, in good faith, a competent person to make such inspection. When it has employed such person in good faith, and has delegated to him that branch of its duty, its liability beyond the value of the vessel and freight ceases, so far as concern injuries from defects of which it has no knowledge, and which are not apparent to the ordinary observer, but which require for their detection the skill of an expert."

On the hearing, however, it developed that repairs had been made to the boiler in a substantial part, and that no inspection was had thereafter. For this failure to comply with the inspection laws, the court held the owner liable to the passengers injured, "to the full amount of damage," section 4,493 United States revised statutes providing that if damage occur to a passenger or his baggage from explosion, etc., happening "through any neglect or failure to comply with the provisions of this title" (inspection), the vessel shall be liable. The court holds that they are statutes in *pari materia*—one creates a rule of general limitation, and the other makes an exception in favor of passengers.

Cargo and Speed Records—Lake Freight Ships.

Iron ore—Coralia, Mutual Transportation Co. of Cleveland, 5,088 gross or 5,699 net tons, Gladstone to Ashtabula, draft of 16 feet 10 inches; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,569 tons gross or 5,117 net tons, Escanaba to South Chicago, draft of 18 feet. From Lake Superior—Steamer Sir Henry Bessemer, Bessemer Steamship Co. of Cleveland, 4,214 gross or 4,720 net tons, Duluth to Conneaut, draft of 14 feet 8 inches.

Grain—Steamer Queen City, A. B. Wolvin of Duluth, 207,000, bushels of corn, equal to 6,210 net tons, Chicago to Buffalo, 16 feet 8 inches draft; steamer Maricopa, Minnesota Steamship Co., Cleveland, 191,700 bushels of corn, Chicago to Buffalo. From Lake Superior—Steamer Queen City, A. B. Wolvin of Duluth, 134,000 bushels of wheat and 42,000 bushels of rye, equal to 5,196 net tons, Duluth to Buffalo, draft of 15 feet 6 inches.

Coal—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 54 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich., Buffalo to Duluth, 997 miles, 65 hours and 10 minutes, 15.3 miles an hour.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Oct. 10, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago	14,614,000	6,685,000
Duluth	5,533,000	10,000
Milwaukee	432,000	71,000
Detroit	533,000	.....
Toledo	782,000	20,000
Buffalo	2,261,000	364,000
Total	24,155,000	7,150,000

As compared with a week ago, the above figures show at the several points named an increase of 1,589,000 bushels of wheat, and 1,006,000 bushels of corn.

Lieut. Geo. H. Stafford, U. S. N., who was recently assigned to the branch hydrographic office, Cleveland, has taken up his new duties.

Tonnage of the Rockefeller steamer Robert Fulton, built by the Detroit Dry Dock Co., is 4,219.74 gross and 3,181.95 net tons.

FOR SALE.

Naphtha Cruising Launch, 38 feet long, 8 feet beam, cabin with four berths, with wash room, ice box, and all modern conveniences, beveled edge plate glass windows, and mahogany finish throughout. Speed 10 miles per hour, bran new last year, and for sale cheap for cash if taken at once. For further particulars address **Box 616, Toledo, O.** Dec. 1

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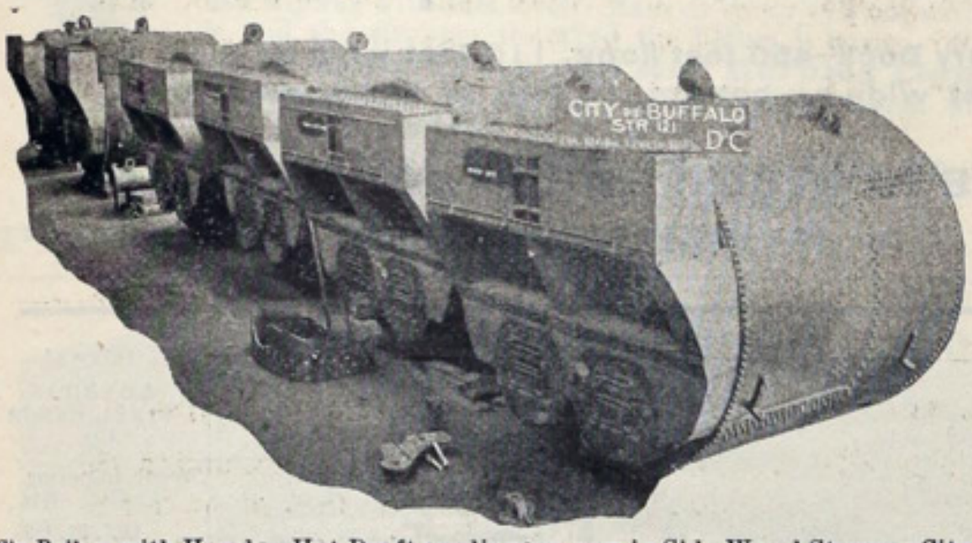
USE AIR AND SAVE FUEL!



Six Boilers with Howden Hot Draft appliances now in Side-Weeel Steamer City of Buffalo. Dimensions of each boiler—12 ft. 6 in. diameter by 12 ft. length.

ECONOMY in operating expenses on Lake Ships must come from reduced coal bills. No great saving can be made in labor cost, and provisions are already low. But fuel bills can be lowered and cheap coal used to advantage by adopting Modern Methods of making steam at low cost.

No manufacturer of pig iron would to-day think of running his furnace without a hot blast. Competition would not permit it. This same competition demands advanced practice in the operation of ships. The same principle is applied in the

HOWDEN HOT DRAFT

Now in use on Lake Steamers aggregating over 40,000 Horse Power.

CAN BE APPLIED TO OLD SHIPS AS WELL AS NEW ONES.

No complicated machinery. Cool engine rooms and cool fire holds. Estimates readily furnished for application of this draft to any steame

DRY DOCK ENGINE WORKS, DETROIT, MICH.

Keeping a sharp look-out for Shipman's Koal Dock.

GIVE US

a chance to prove that we can coal your boats with quick dispatch, and with most satisfactory fuel.

We have Four Large CHUTES on our Docks at AMHERSTBURG, ONTARIO, 1,000 FEET RIVER FRONT and Day and Night Force.

OUR STOCK CONSISTS OF

"Keystone" Massillon, Youghiogheny, and Best Grades of Hocking Koals.

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Cuddy-Mullen Coal Co.

Lake Shippers of Steam Coal.

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—
Car Dumper; Eight Pockets; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—
Amherstburg, Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

SAULT RIVER BRANCH—
Pocket Dock now under construction.

Good Coal; Courteous Attention; Quick Dispatch.

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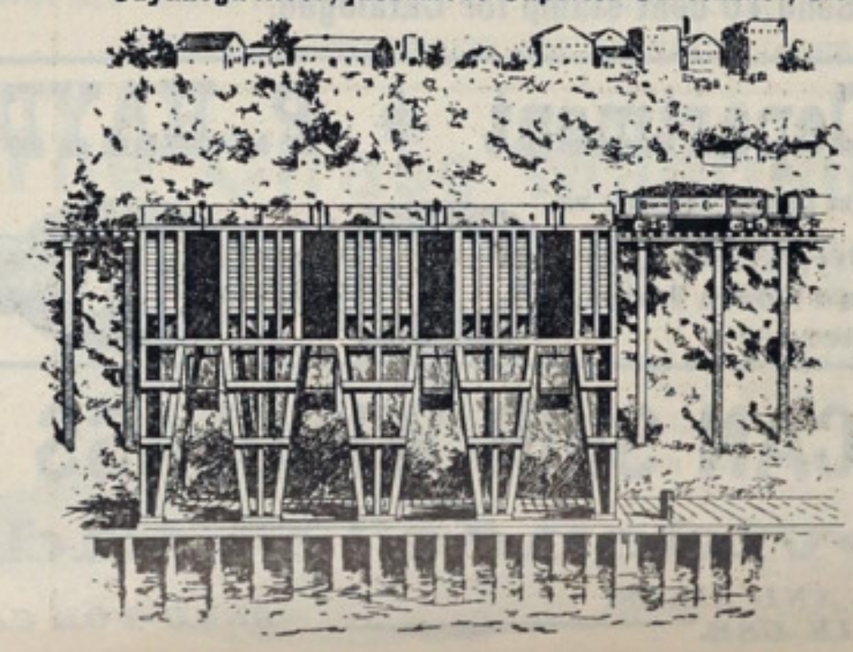
FUEL DOCKS OF OSBORNE, SAEGER & CO.

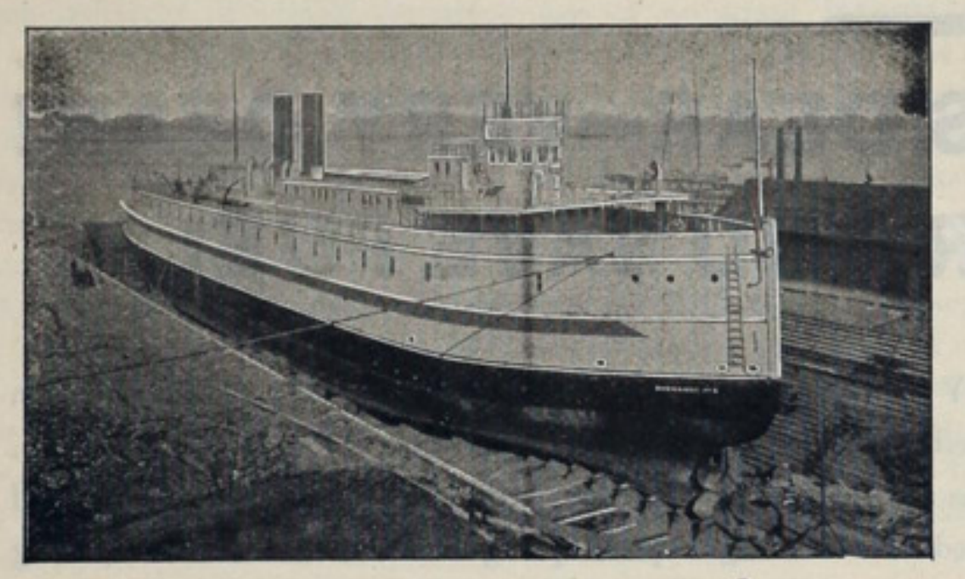
Cuyahoga River, just above Superior St. Viaduct, Cleveland, O.



Best Youghiogheny Steam Coal Furnished Day or Night. No delay as Elevated Pockets are used.

Bertram's Oil Polish. The Marine Polish of the World.

For Brass and all Metal Surfaces it is unequalled. It is cheaper, requires less work and retains it brilliancy longer than any metal polish made. Acknowledged the standard of excellance by the U.S. government in the marine departments. For sale by ship chandlers and engineers supplies stores. BERTRAM OIL POLISH CO., 220 & 22 State St., BOSTON, MASS.



Shenango No. 2, 300 feet long, 54 feet beam.

CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,

Metal and Wooden Ship Builders.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships A Specialty.

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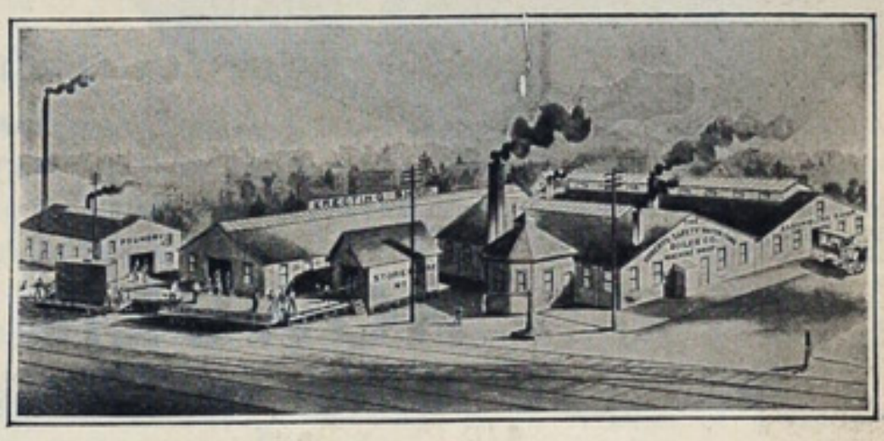
JOHN H. ATWOOD, Assistant Secretary.

Lake Marine Department.

GEORGE L. McCURDY, Manager
CHICAGO, ILLS.



Office of
AMERICAN STEEL BARGE Co.

West Superior Wis.,
Oct. 31, 1895.

The Roberts Safety Water-Tube Boiler Co., 39 and 41 Cortlandt St, New York

Gentlemen: Replying to yours of the 28th I am glad to say that the boiler you furnished us for tug "ISLAY" is giving entire satisfaction. I have heard no complaint about it whatever, but have heard a good deal in its favor. I ride on the boat frequently and must say that I am much pleased with its work. Very Truly yours, Alexander McDougall, General Manager.

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Adapted for use in Yachts, Launches, and Vessels of all Kinds.

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SOLE MANUFACTURERS OF

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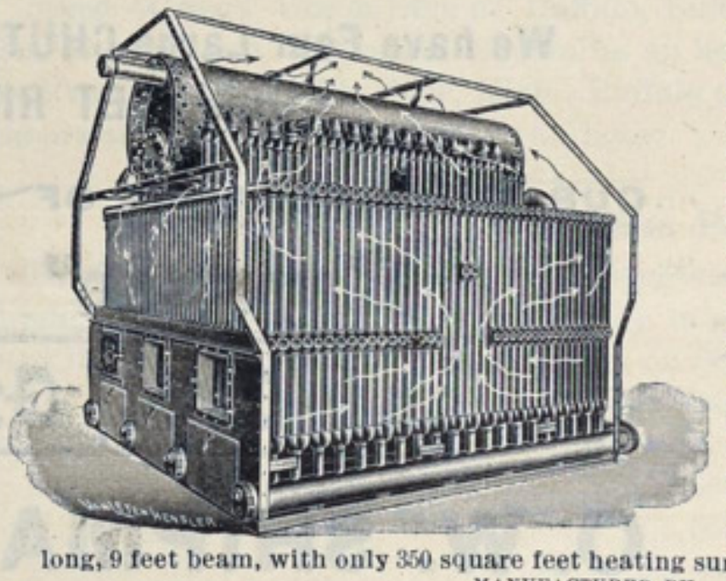

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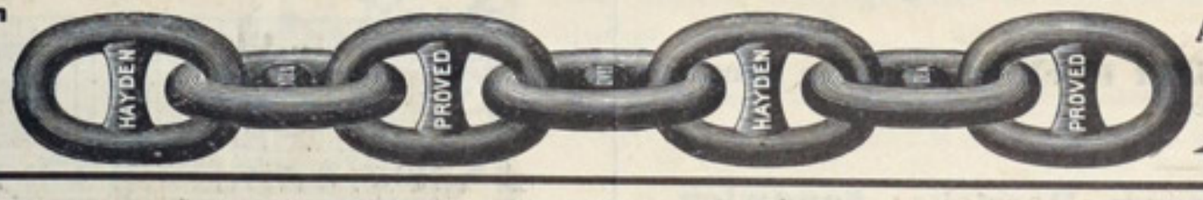

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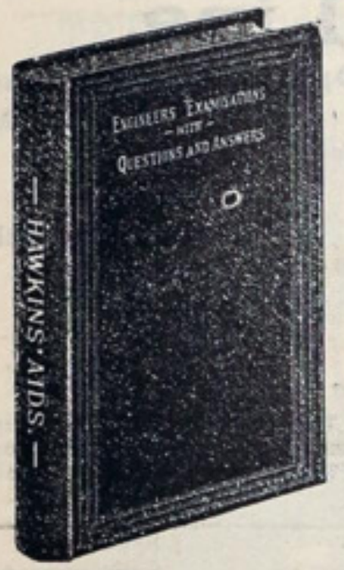

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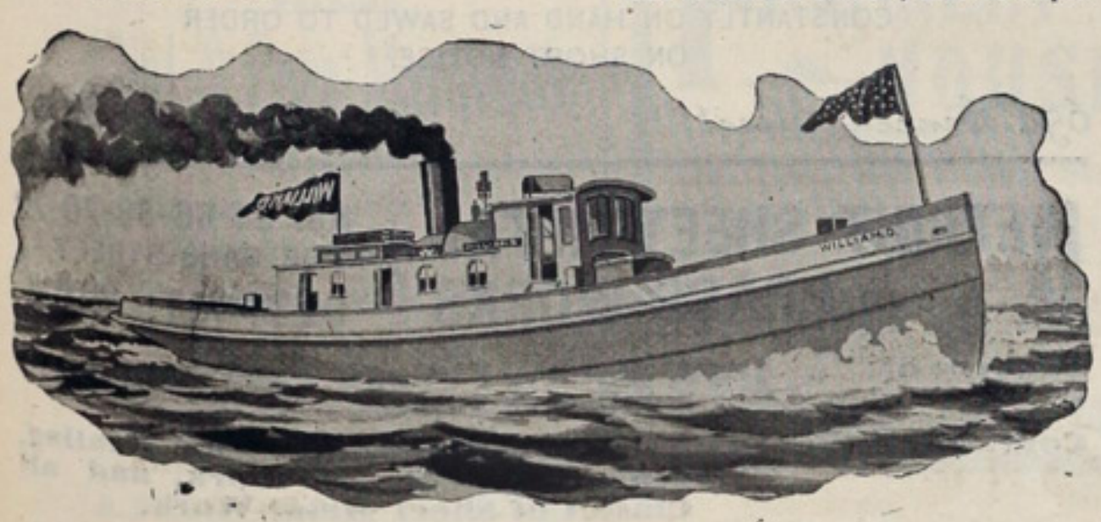

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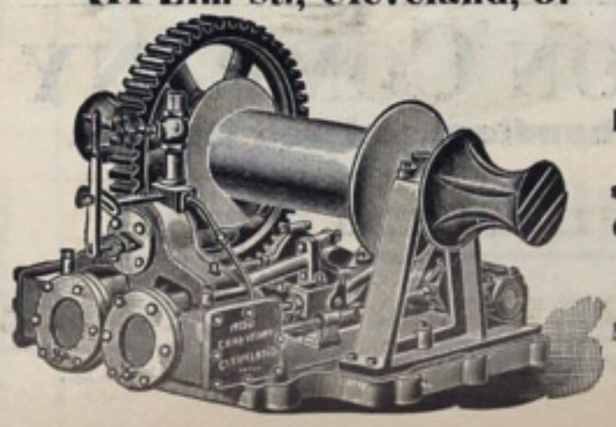

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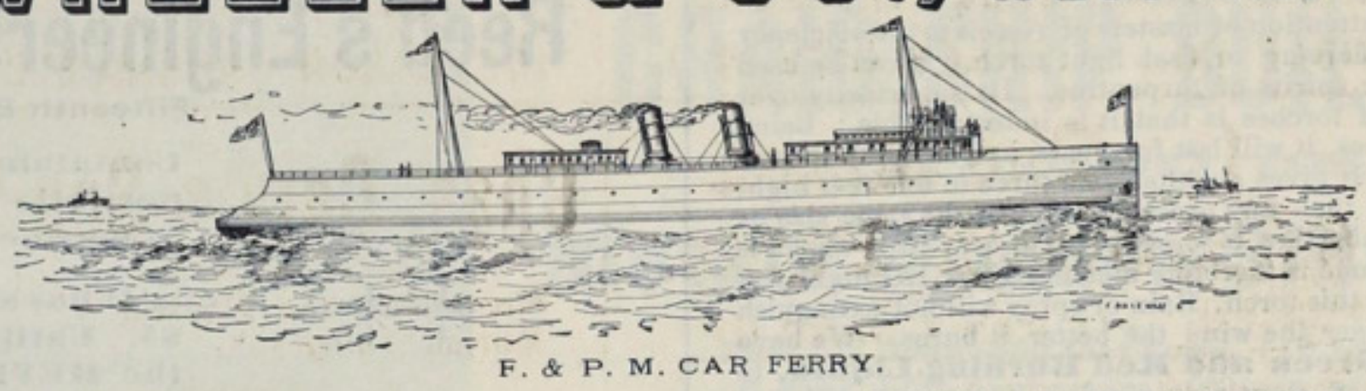

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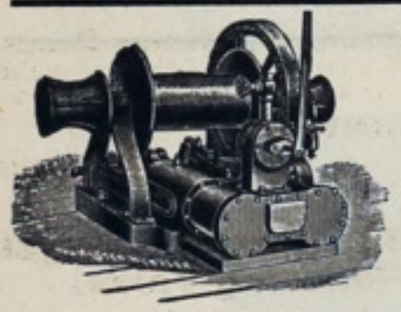

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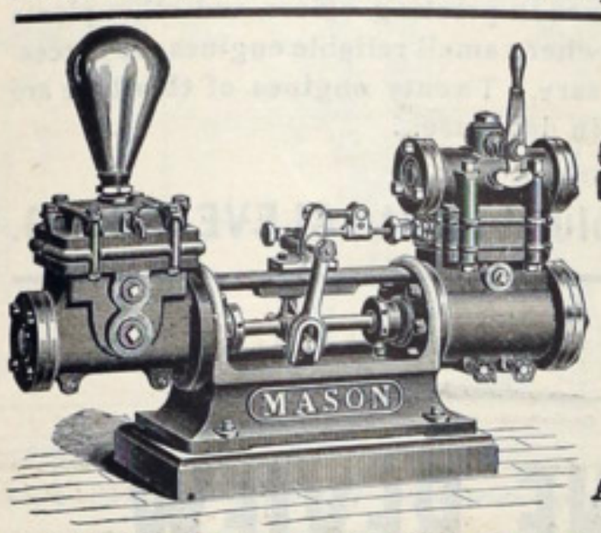

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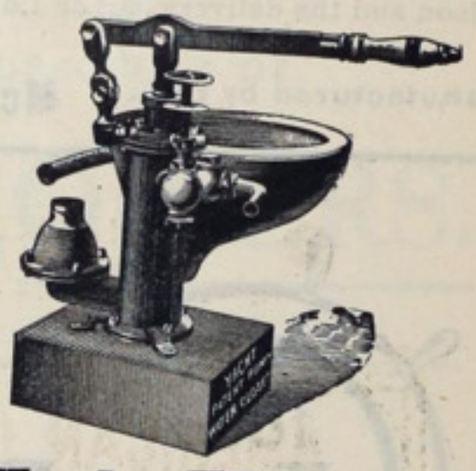

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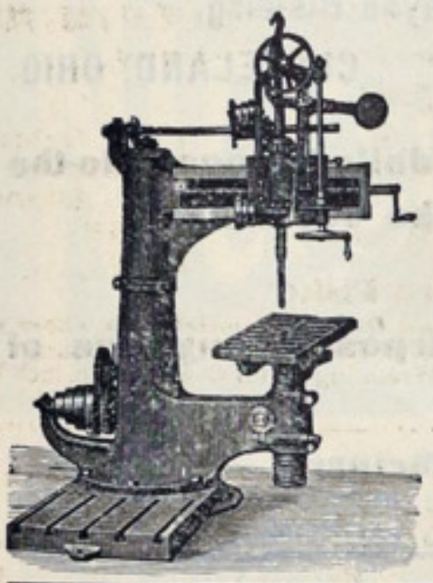

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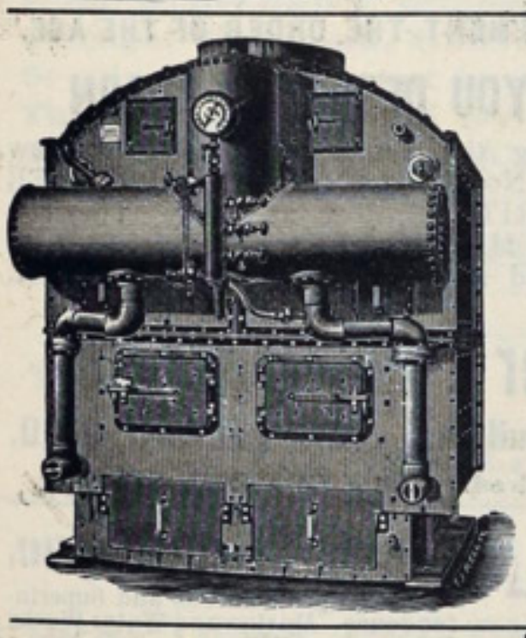

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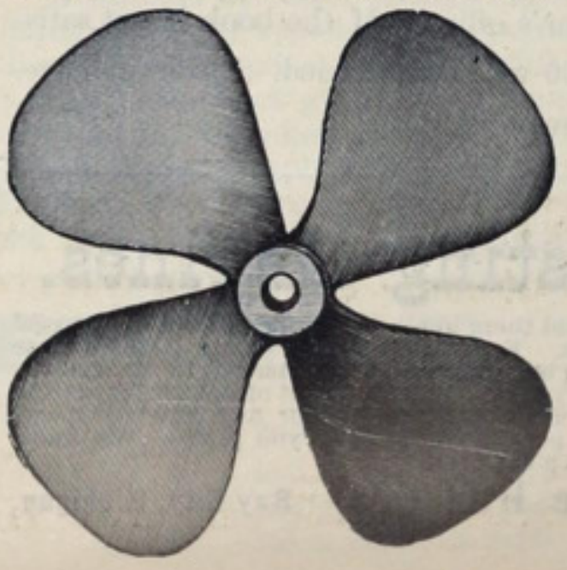

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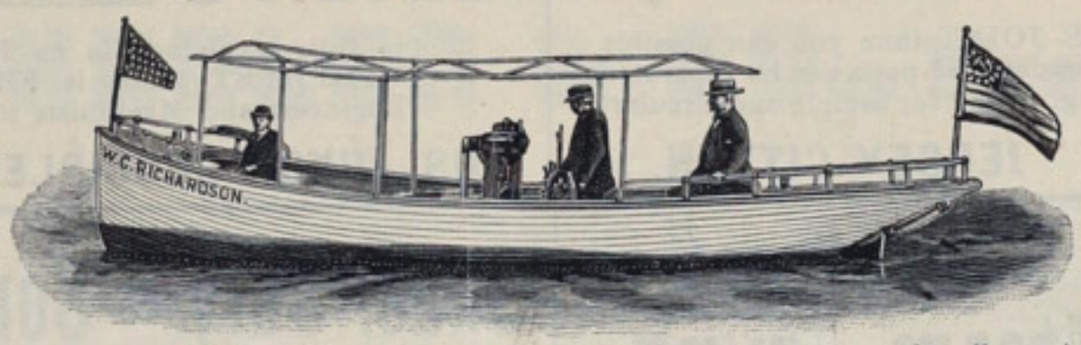

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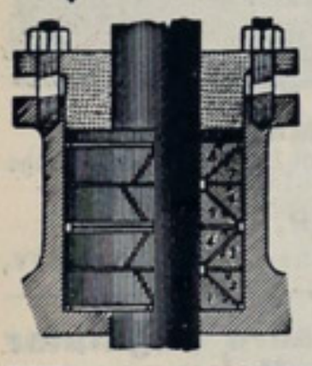

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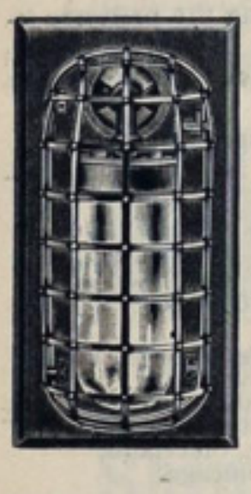

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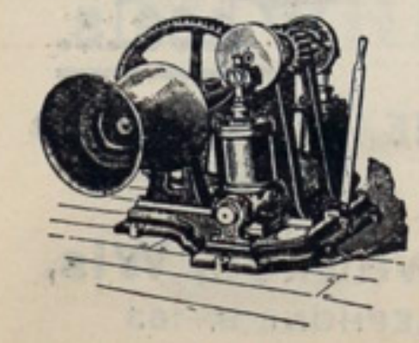

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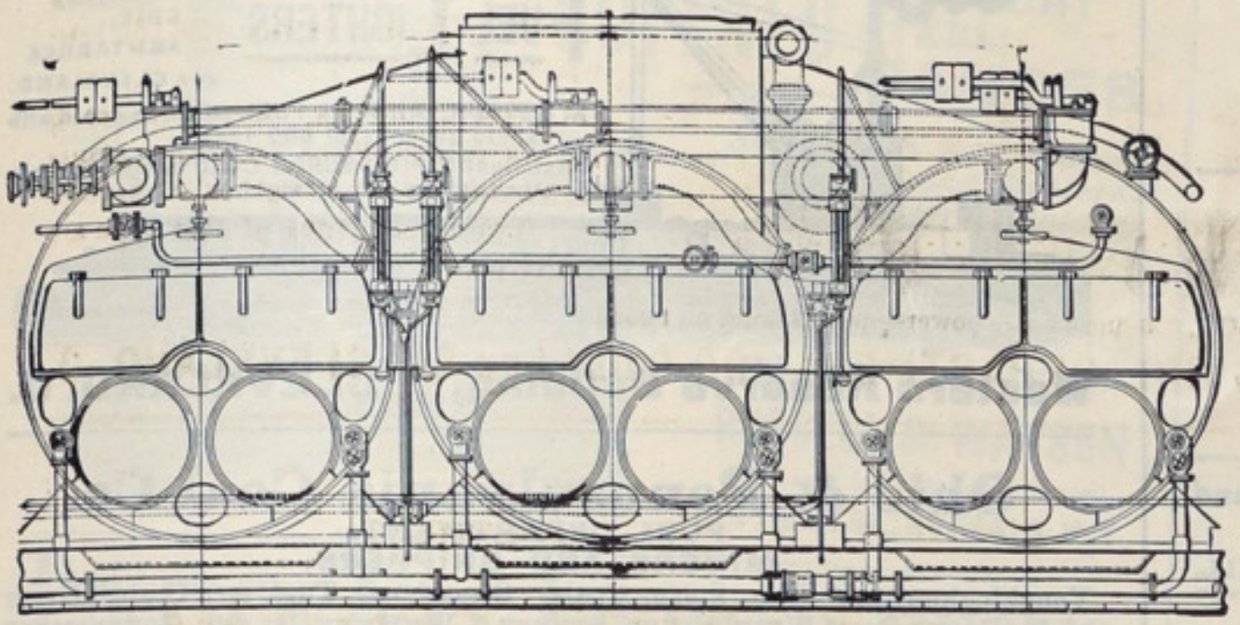

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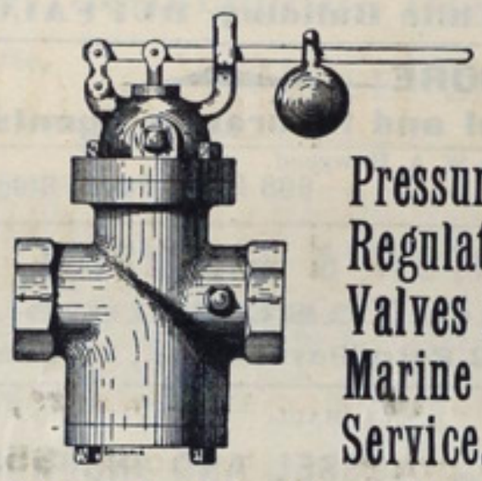

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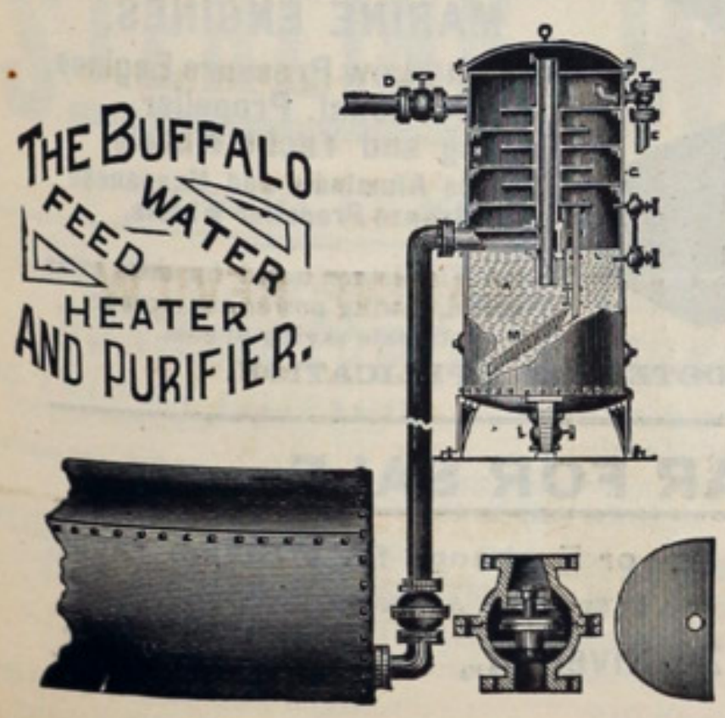

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A.—Settling chamber.
B.—Boiler.
C.—Feed pipe to boiler.
D.—Steam pipe.
E.—Water supply pipe.
F.—Check valve.
G.—Spray disks.
H.—Spray chamber.
I.—Equalizing tube.
J.—Blow-off pipe.
K.—Automatic shut-off valve.
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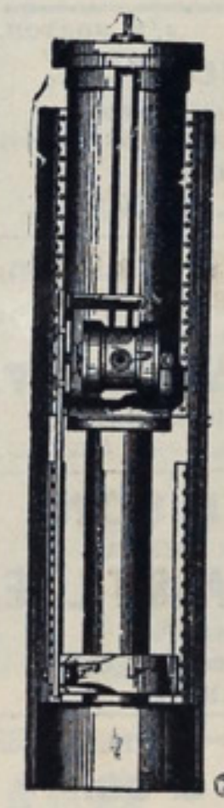

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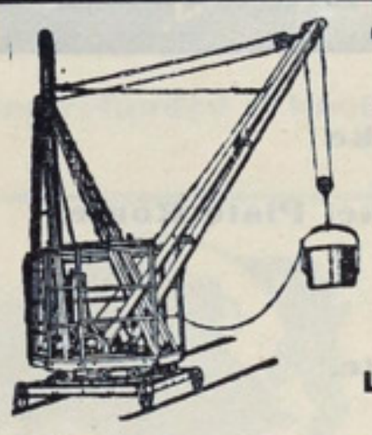

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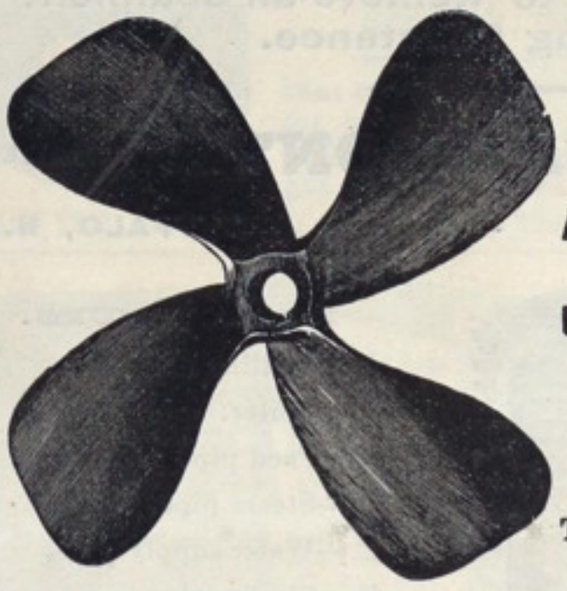

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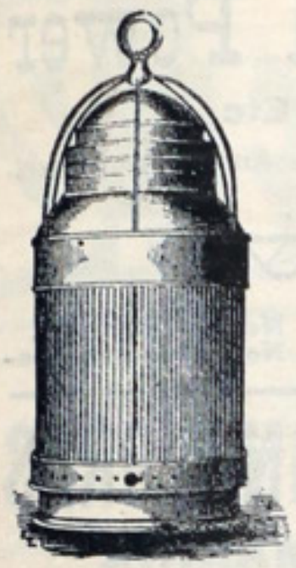

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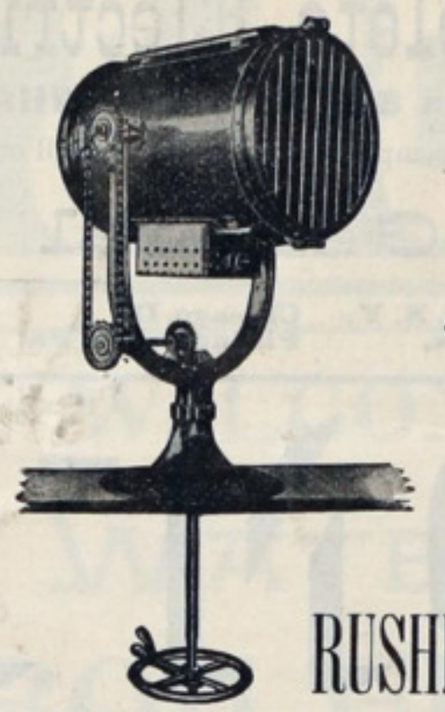

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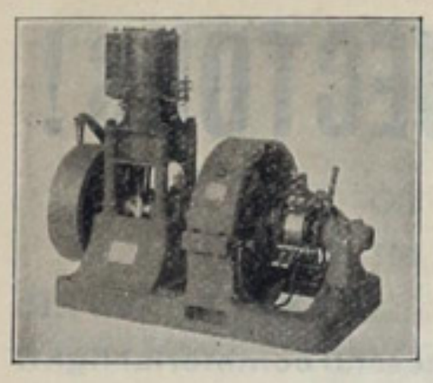

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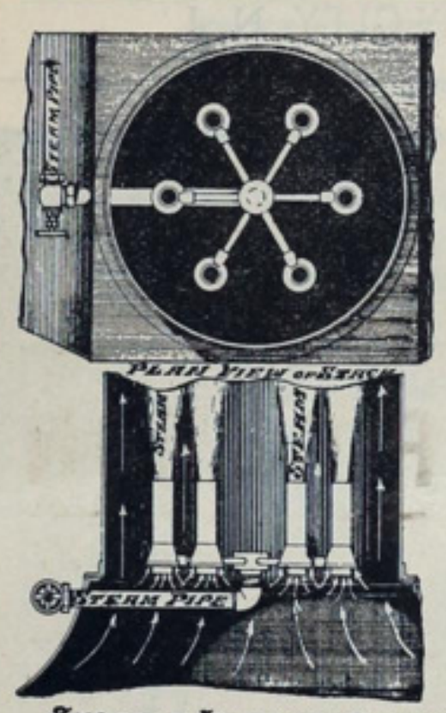

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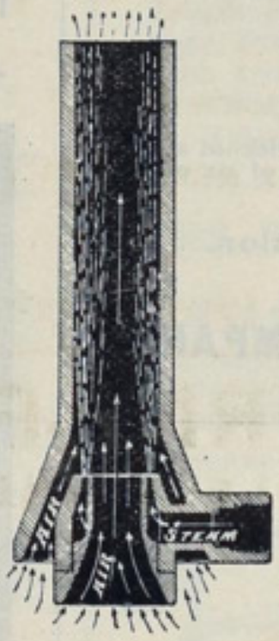

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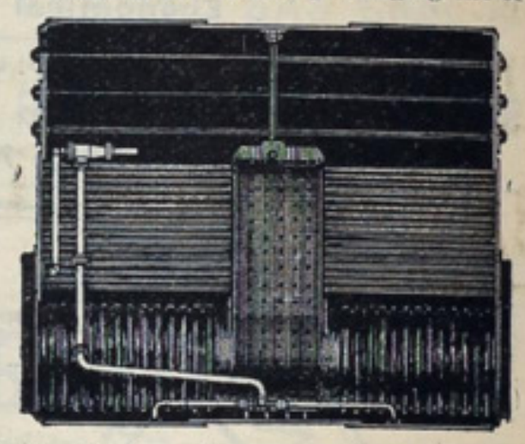

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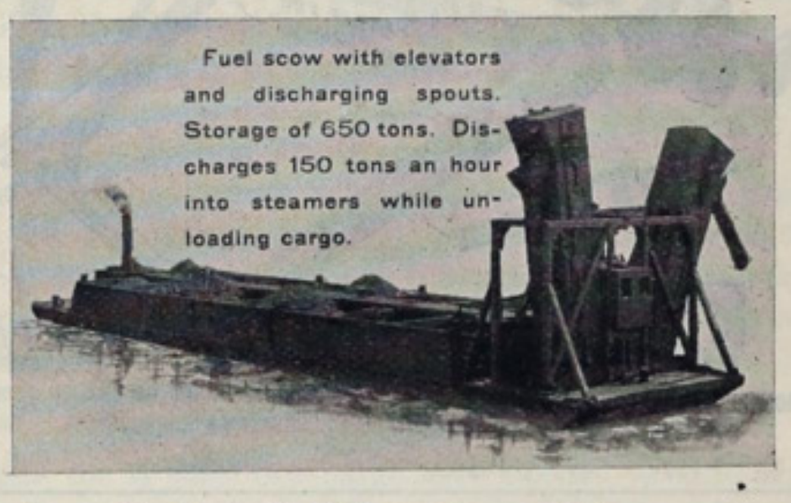

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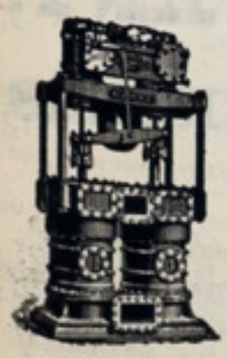

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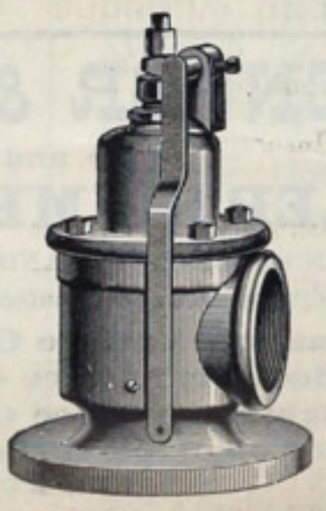
Single and Duplex Pumps for Boiler Feed, Fire or Bilge Service—Vertical and Horizontal.

Vertical and Horizontal Pumps, Air Pumps for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.



CROSBY STEAM GAGE AND VALVE CO.,

Sole Proprietors and Manufacturers of

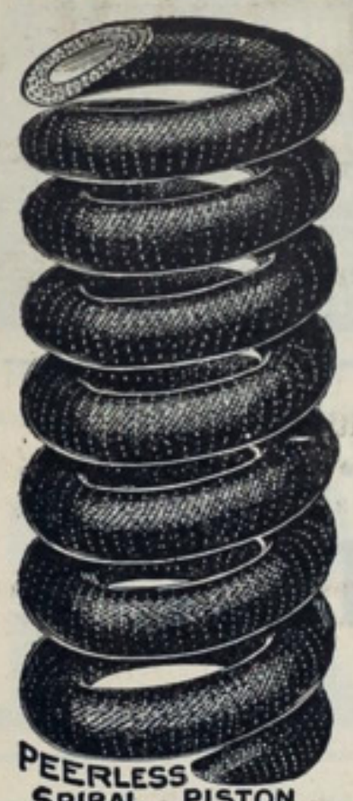
Crosby Pop Safety Valves and Water Relief Valves, Crosby Improved Steam Gages, Single Bell Chime Whistles, Patent Gage Testers, Victory Lubricators, and other specialties.

The Crosby Steam Engine Indicator, when required, is furnished with Sargent's Electrical Attachment, by which any number of diagrams can be taken simultaneously.

BRANDEN PUMP VALVES, rubber with wire-coil insertion.

Manufacturers of all kinds of Pressure and Vacuum Gages, Water Gages, Gage Cocks, Radiator Cocks, and other Engine and Boiler Fittings and Supplies.

Branch Offices at New York, Chicago and London,
Main Office and Works at BOSTON, MASS



Peerless Piston and Valve Rod Packing

IN SPIRAL FORM OR IN COILS.

WILL HOLD 400 LBS. STEAM. 20 YEARS OLD AND NO EQUAL.

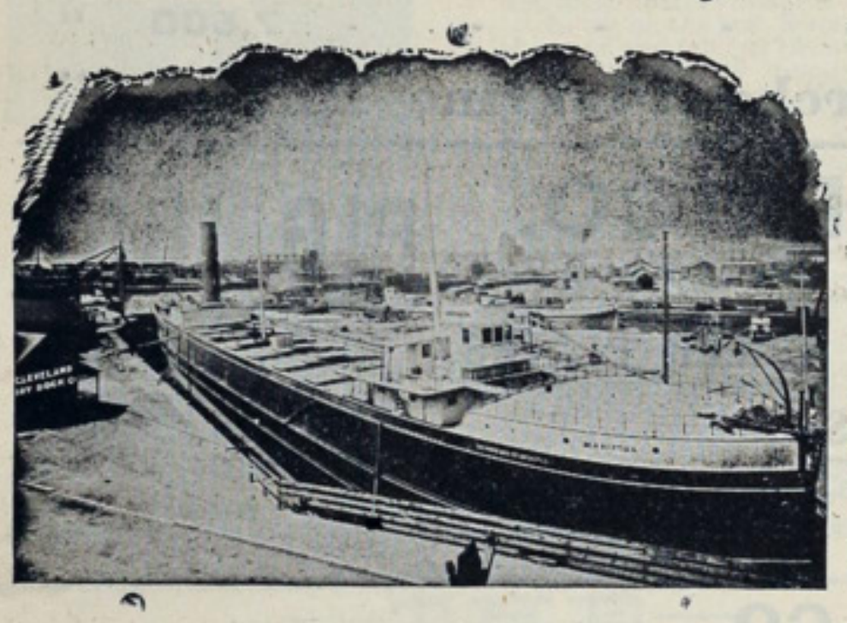
Manufactured Exclusively by

PEERLESS RUBBER MFG. CO.,

16 Warren Street, NEW YORK.

FOR SALE by the LEADING SHIP CHANDLERS and SUPPLY HOUSES.

The Cleveland Dry Dock Co.



148 Elm St., Cleveland, O.

Telephone 1616.
Resid. 'Phone 4080.

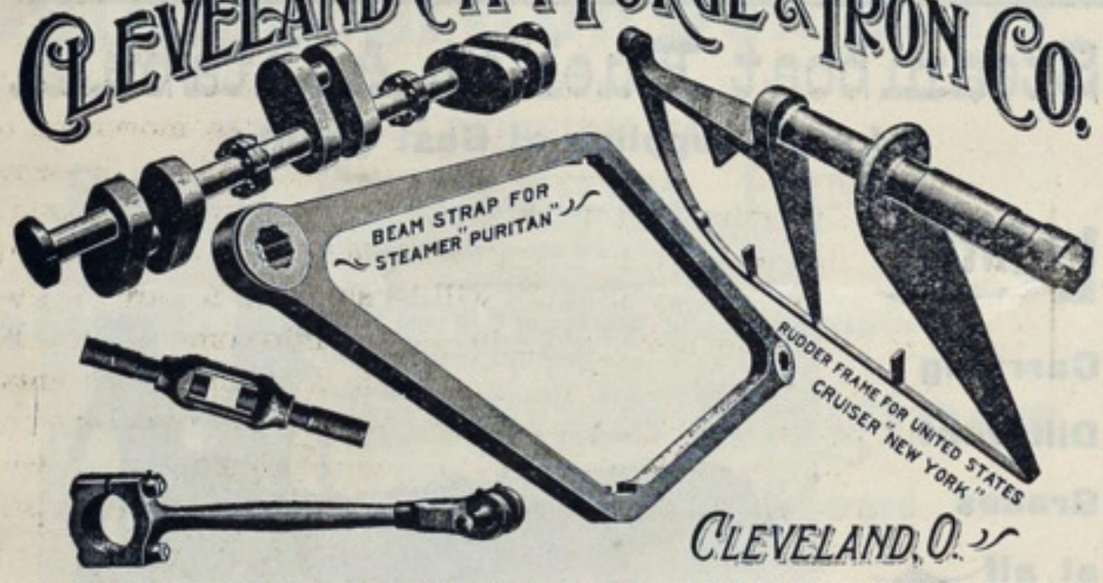
REPAIRING A SPECIALTY.

Dimensions of Dock:

Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W. W. BROWN
Sec'y & Mgr.

CLEVELAND CITY FORGE & IRON CO.



CLEVELAND, O.

IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

UNITED STATES ENGINEER OFFICE, Duluth, Minn., Sept. 20, 1896. Sealed proposals for rip rap embankment at Agate Bay (Two Harbors), Minn., will be received until noon, Oct. 20, 1896, and then publicly opened. Information given on application. CLINTON B. SEARS, Maj., Engrs. Oct. 17.

H. W. Johns' Boiler and Pipe Coverings.

ASBESTOS MATERIALS OF ALL KINDS.

Wicking, Fibre, Mill Board, Felt, Packing, Cement, Liquid Paints, Roof Paints, Fire-Proof Paints, etc.

Made in Sections Three Feet Long, to Fit Every Size of Pipe.

ABSOLUTELY FIRE-PROOF.

THE CHASE MACHINE CO. 111 ELM ST. CLEVELAND, O.

H. W. JOHNS MFG. CO 32 SOUTH WATER ST.

AMERICAN STEEL BARGE CO.

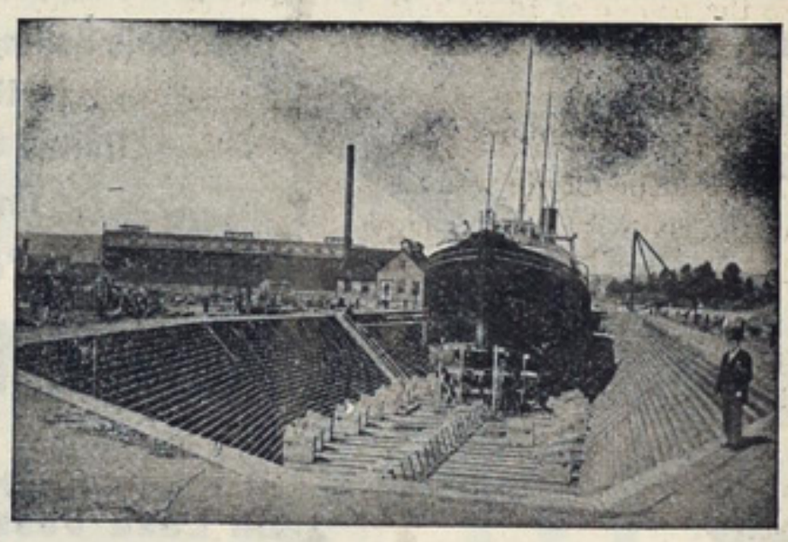
STEEL and METAL SHIPS

Of all classss built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Photograph of 300 ft. Boat in Dock.

Plates & Material Always on hand to Repair all kinds of Metal Ships in Shortest Time.



Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

Length, extreme	537 feet.	Entrance, Top	55 feet 9 in.
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

LARGEST DRY DOCK ON THE LAKES.

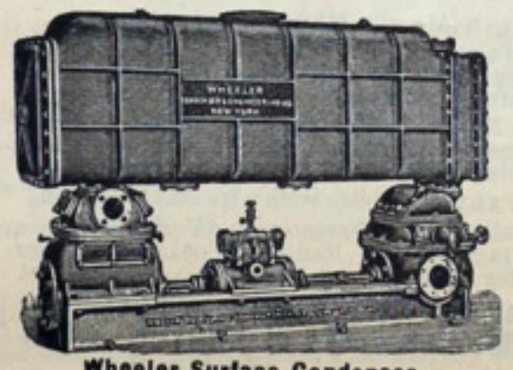
Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

WHEELER CONDENSER & ENGINEERING COMPANY,

39 and 41 CORTLANDT STREET, NEW YORK.



Wheeler Surface Condenser.
Mounted on Combined Air & Circulating Pumps.

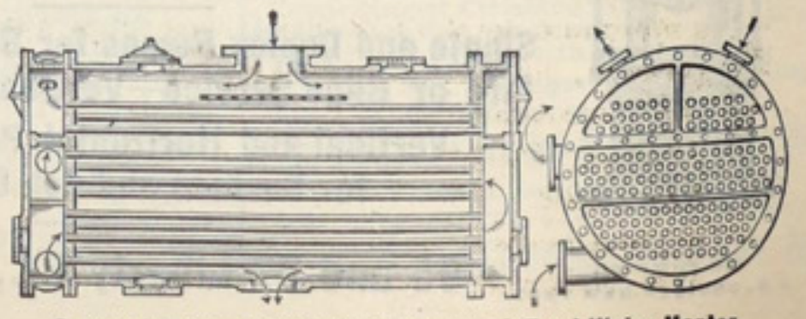
WHEELER'S IMPROVED SURFACE CONDENSERS

MOUNTED UPON COMBINED AIR AND CIRCULATING PUMPS.

Sole Proprietors and Manufacturers of the

Wheeler Standard Surface Condenser.
Wheeler Admiralty Surface Condenser.
Wheeler Lighthall Surface Condenser.
Volz Patent Combined Surface Condenser and Feed Water Heater.

Wheeler's Improved Marine Feed Water Heater.



Patent Combined Surface Condenser & Feed-Water Heater.